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Teachers' Digital Competence and Its' Influence on the Implementation of Technology-Enhanced Pedagogy in Public Primary Schools in Monduli District Council

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Abstract*: This study examined teachers' digital competence and its influence on the implementation of technology-enhanced pedagogy in public primary schools in Monduli District Council. Specifically, the study teachers' skills in using digital technologies for learners' assessment and evaluation and examined factors limiting teachers' integration of digital tools in assessment and evaluation. The study was guided by the Technological Pedagogical Content Knowledge theory. Mixed methods approach and convergent design were employed. The target population comprised 5,120 respondents, including 652 teachers, 74 head teachers, 74 academic teachers and 4,320 Standard Six pupils. The sample size of 384 included 60 teachers, 12 head teachers, 12 academic teachers and 300 Standard Six pupils. Simple random, purposive and stratified sampling techniques were used. Data were collected through questionnaires, interview guides and focus group discussions. Validity and trustworthiness were ensured through expert review, pre testing, member checking and triangulation, while reliability (0.842 to 0.894) was ensured through Cronbach's alpha. Quantitative data were analysed through descriptive using SPSS version 25. Qualitative data were analyzed through thematic analysis. Confidentiality, anonymity and plagiarism check were observed. The findings revealed that teachers had moderate digital competence in planning, teaching and learner assessment, although their use of digital tools remained limited by inadequate training, limited devices, poor internet access, high data costs and weak technical support. The study concluded that teachers' digital competence influenced technology-enhanced pedagogy but remained constrained by contextual and institutional barriers. The study recommended regular practical training, improved digital infrastructure, reliable internet access and stronger school-based technical support.***

Key words: *Digital competence, Technology-enhanced, Pedagogy, Teacher, Infrastructure, Tanzania*

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1. Introduction

The application of digital technologies in teaching has increased significantly worldwide as educational institutions incorporate interactive platforms, simulation tools and multimedia resources into their curricula (Fardad and Fardad, 2023). This growth is reflected in the wider use of digital applications that enable teachers and students to interact with educational content in more varied and accessible ways (Ghory & Ghafory, 2021). The COVID-19

pandemic accelerated this trend, pushing schools to rapidly adopt technology to maintain education during disruptions and prompting a shift towards technology-based teaching methods (Mack et al., 2023).

Effective integration of technology in teaching and learning requires teachers to be competent in lesson planning, content delivery and assessment. Competence in planning includes designing lessons that thoughtfully integrate digital tools to enhance students' learning (Tzafilkou et al., 2023). The ability to use technology effectively during instruction is crucial for delivering content and supporting learners (Ghory and Ghafory, 2021). Competence in assessment involves evaluating student learning through digital methods (Dias-Trindade and Moreira, 2020). Teacher competence in planning, using and assessing with technology forms the foundation for successful technology-enhanced pedagogy.

In Europe, the use of digital technologies in education has grown substantially, supported by excellent digital infrastructure and extensive professional development initiatives. Teachers in Romania report relatively high levels of digital competence and use of digital platforms, though challenges remain in digital assessment and fostering students' digital skills (Fardad and Fardad, 2023). Portuguese teachers benefit from strong infrastructure and ongoing training, yet there are still areas to improve in integrating technology for assessment and skill development (Moreira et al., 2023). In Spain, many teachers widely adopt online platforms (Palacios-Rodríguez et al., 2024). England has seen wide spread adoption of digital tools, supported by national frameworks, but teacher confidence and consistency in technology use for assessment vary (Passey, 2021). Developments across Europe highlight the importance of continual investment in both infrastructure and training to meet evolving educational needs.

In Ghana, teacher digital competence has improved through targeted training programs and government initiatives, yet many still lack confidence and consistent access to digital resources (Asare-Doku et al., 2022). Moroccan national education reforms have promoted technology integration and digital literacy, but teachers identify ongoing needs for training and infrastructure upgrades to fully utilize digital tools (ElBaroudi and Bojji,2021). These circumstances reflect a dynamic landscape where efforts to expand technology-enhanced pedagogy are influenced by both national policies and local realities.

In Monduli District, the use of technology applications to support teachers' professional development has been associated with a number of constraints including restricted internet access, high data costs, limited digital training and irregular access to professional development programmes (Makula et al., 2025). These conditions suggested that many teachers experience difficulties integrating digital technologies effectively in instructional planning, classroom teaching, and learner assessment and evaluation. ICT mediated teaching has been incorporated into teacher education curricula to strengthen teachers' ability to integrate technology into lesson preparation, teaching and assessment (Chalale et al., 2025). However, the level of practical implementation of such competencies in schools varied depending on contextual conditions such as infrastructure availability and teachers' digital competence. It was from this background that the current study was conducted to examine teachers' digital competence and its' influence on the implementation of technology enhanced pedagogy in public primary schools in Monduli District Council.

1.1 Research Questions

The following were the questions that guided this study:

1. To what extent are teachers skilled in using digital technologies for learner assessment and evaluation in public primary schools in Monduli district?
2. What factors limit teachers' integration of digital tools in instructional planning, classroom teaching, and assessment & evaluation in primary schools in Monduli District?

2. Literature Review

The study was grounded in the Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra and Koehler in 2006.

2.1 TPACK Framework

Mishra and Koehler (2006) explain that effective technology-enhanced teaching requires the integration of technological, pedagogical and content knowledge. Technological knowledge concerns teachers' ability to select, operate and manage appropriate digital tools. Pedagogical knowledge involves selecting teaching and assessment methods that respond effectively to learners' educational needs. Recent applications indicate that teachers require integrated knowledge when using technology for teaching, assessment and learner support (Tzafilkouetal., 2023). Content knowledge concerns teachers' understanding of the subjects and concepts taught to learners. The framework assumes that possessing technological skills alone cannot produce meaningful technology-enhanced pedagogy. Effective digital teaching consequently occurs when teachers connect appropriate technologies with subject content and suitable instructional practices.

2.1.1 Strengths of TPACK framework

A major strength of the framework is its comprehensive explanation of the knowledge required for meaningful

digital technology integration. Its three knowledge domains enable researchers to examine teacher competence beyond basic operation of computers and other digital devices. The framework also distinguishes ordinary technology use from pedagogically appropriate use directed towards specific learning objectives. Studies involving elementary teachers have applied TPACK to assess relationships between technological knowledge, teaching approaches and subject-content delivery (Lachner et al., 2021). The framework can therefore guide the assessment of teachers' competence in instructional planning, classroom teaching and learner assessment. Research among primary school teachers further indicates that effective integration depends on connections between technology, pedagogy and content knowledge (Nilsson &and Lund, 2022).

2.1.2 Application of TPACK framework

The framework was applied because its components corresponded directly with the major areas examined in the current study. Technological knowledge guided assessment of teachers' ability to operate digital devices, software, internet resources and digital storage systems. Pedagogical knowledge supported examination of teachers' use of technology during lesson planning, classroom interaction and learner assessment. Content knowledge explained whether teachers selected digital resources that corresponded with curriculum topics and intended learning outcomes. The framework has also been applied in Tanzania to understand the interaction between technological and pedagogical knowledge within digitally supported teaching (Mtebe and Raphael, 2024). Further, TPACK help to interpret whether teachers moved beyond basic device use towards meaningful technology-enhanced teaching. It guided the development of questionnaire, interview and focus group items addressing instructional planning, classroom teaching and assessment practices. The framework therefore provided an appropriate foundation for examining teachers' digital competence and implementation of technology-enhanced pedagogy in Monduli District Council

2.2 Empirical Review

The review is organized around social services, housing, transport, and communication, following the study objectives. Each study is examined through its methods, findings, limitations, and contribution to the current research gap.

2.2.1 Teachers' Skill in Using Digital Technologies for Learner Assessment and Evaluation

Bez et al. (2025) conducted a study in Switzerland on how teachers process technology based formative assessment results when using digital assessment systems. The study used a qualitative think aloud methodology where 48 in-service teachers verbalized their thinking while analysing digital formative assessment results and screen recordings were coded and analysed using cluster analysis. The study found that teachers differ in how they interpret digital assessment results and noticing results alone is not enough for making instructional decisions. Viberg et al. (2024) conducted a study in Sweden on teachers' digital assessment practices and development of instruments for measuring pedagogical digital assessment knowledge. The study used a survey design involving 219 university lecturers and data were analysed using exploratory factor analysis and structural equation modelling. The study found that pedagogical knowledge and pedagogical content knowledge are critical for effective digital assessment practice. The study was limited because it focused only on university lecturers.

Latif et al. (2024) conducted a study in an international context focusing on AI based automated assessment reporting systems used in schools. The study used a systematic review design guided by cognitive load theory focusing on technology-enhanced assessment reporting systems. The study found that poorly designed digital assessment reporting tools increase teacher cognitive load and reduce effective use of assessment data. Banitalebi et al. (2025) conducted a study in Iran and Newzealand on measuring teacher assessment literacy in digital environments. The study used questionnaire development methodology involving expert validation and confirmatory factor analysis using teacher responses to a scenario based self-report tool. The study found that teachers show positive attitudes toward digital assessment, but actual digital assessment practice remains lower. The study was limited because it relied on self-report measures of competence. Ibrahimi et al. (2024) conducted a study in Albania on the integration of ICT tools in teaching among science teachers. The study used an online survey and interpretative analysis of responses from middle and secondary school teachers. The findings revealed that teachers have limited ability to use ICT tools effectively due to absence of infrastructure and training. However, the study relied solely on self-reported online survey data without observation.

2.2.1 Factors that limit teachers' integration of digital tools in instructional planning, classroom teaching, and assessment & evaluation

Joo et al., (2024) in German conducted a quantitative cross-sectional survey of 272 German primary school teachers using the UTAUT model. The study found that performance expectancy, effort expectancy, digital competence and facilitating conditions influenced teachers' intention to use digital platforms. Despite positive intentions, transformative classroom use remained limited due to insufficient advanced training, rigid curriculum structures and limited time. However, the study focused on intention rather than observed classroom practice and was conducted in a context with strong technological infrastructure. Liu et al., (2025) conducted a study in China thereby employing a qualitative multiple-case study involving 13 participants (8 teachers and 5 administrators) in four urban Chinese primary schools. Teachers mainly used digital tools for

content presentation rather than transformative learning. Limiting factors included teacher-centred beliefs, examination pressure and limited confidence in student-led digital learning. Mhlanga and Moloi (2024) in South Africa conducted a qualitative case study with 15 rural primary teachers in Limpopo Province using the TPACK framework. Findings showed technology was mainly used for displaying notes rather than transforming pedagogy. Challenges included limited ICT pedagogical knowledge, unreliable electricity, inadequate training, and weak leadership support. However, the small sample size and focus on teacher knowledge limited broader systemic analysis.

A study conducted in Tanzania by Mtebe et al., (2022) employed a cross-sectional survey of 428 teachers across Tanzania to assess ICT preparedness. Although teachers showed positive attitudes, technology use remained largely at substitution level due to inadequate pedagogical training, limited internet access, device shortages and weak technical support. However, the study combined primary and secondary schools, relied solely on self-reported data and did not focus on a specific rural district instead, focus only on urban areas. Novatus and Mrema (2025) conducted a study in Moshi –Tanzania titled Assessment of ICT Integration in competence-bases Curriculum, the study focused on Public Primary Schools and employed mixed methods approach used a convergent parallel design. The study also employed the sample of 266 respondents. The most significant challenge reported was the shortage of ICT facilities such as computers, tablets, and projectors. The study also found the following challenges; poor digital infrastructure, limited ICT skills and confidence among teachers, inadequate technical and financial support, frequency power outage and limited experience with educational Technologies. To overcome these challenges the study recommended the increased provision of ICT facilities, development of digital infrastructure in schools, improve internet connectivity, providing continuous professional development, strengthening technical support, addressing electricity shortages and ongoing maintenance of ICT infrastructure. The study was limited in data collection since it involved only Government officials, head teachers and teachers while pupils were exempted from participating in the study. Exempting pupils may limit the breadth of data gathering.

3. Methodology

The study employed convergent mixed-methods research design. A convergent design involves collecting quantitative and qualitative data during the same phase, analyzing them separately and integrating the results during interpretation (Creswell and Creswell, 2023). The design gives equal importance to both forms of data and allowed the researcher to compare numerical patterns with participants' experiences concerning the same problem. The target population comprises 652 teachers, 74 head teachers, 74 academic teachers and 4,320 standard six students from public primary schools in Monduli District, Tanzania, totaling to 5,120 individuals (PMO-RALG, 2026). Teachers were included because they are the main implementers of technology enhanced pedagogy and they use digital tools during lesson planning, teaching and assessment. The head teacher of each school was also included because of overall supervision and leadership responsibilities in implementation of digital related teaching practices (Taherdoost, 2022). Academic teachers were included because they coordinate academic activities in schools and they monitor teaching quality, lesson preparation, and assessment practices, which are directly linked to the use of digital tools in pedagogy. Standard six students were included because they are active recipients of teaching and learning processes and they can provide information about how digital tools are applied during lesson preparation, presentation and evaluation.

The sample size for the current study was 384 respondents consisting of 12 head teachers, 12 academic teachers, 60 teachers and 300 standard six pupils selected from the 74 public primary schools in Monduli district. This sample size was determined using Cochran formula whereby z = 1.96, p is the proportion of the population with the characteristics of interest (0.5) and q = 1 – p while e= margin of error which is 0.05.

$$n = \frac{z^2 pq}{e^2}$$

$$n = \frac{1.96^2 x(0.5)(1-0.5)}{0.05^2}$$

$$n = 384$$

Purposive sampling was used to select head teachers and academic teachers because these respondents hold specific administrative and academic coordination roles that are directly linked to supervision of teaching and integration of digital technologies in schools, such participants are selected based on their specific purpose (Okendo et al., 2020). Therefore, they were selected based on their positions and experience. Stratified sampling was used to select standard six pupils. Pupils were grouped into gender to ensure equal representation of male and female students as stratification enhances subgroup representation (Creswell and Creswell, 2023). Stratified random sampling was also used to select teachers because this procedure gives all teachers an equal chance of being selected and helps to reduce selection bias while ensuring that the selected sample represents the larger teacher population and ensures gender representation. A total of 25 standard six pupils were selected from each school to provide adequate learners' views on the use of digital tools in teaching and learning. A total of 5 teachers were selected from each school to ensure representation of classroom teaching experiences related to technology enhanced pedagogy. The academic teacher of each school was included because of the academic

coordination role performed at school level. Criterion purposive sampling involved selecting head teachers who satisfy predetermined conditions in the study (Memon et al., 2025).

Data for this study were collected using questionnaires, interview guides and focus group discussions. The questionnaire were administered to teachers, interview guides to head teachers while focus group discussions to standard six pupils. For quantitative data, content validity was ensured through expert review where specialists in educational technology and research methodology examined the questionnaire to determine relevance, clarity and alignment with research objectives (Setiawan et al., 2024). Their comments focused on the relevance, clarity, sequencing, language, and coverage of the items. Ambiguous, repetitive, and unrelated items were revised or removed before data collection. For qualitative instruments, member checking was used where some respondents verified the accuracy of recorded information to improve credibility of the qualitative findings (Lloyd et al., 2024; Member check, 2025). Triangulation of data sources including teachers, head teachers, academic teachers and pupils were also used to strengthen validity of qualitative findings by corroborating evidence from different perspectives (ATLAS.ti Guide, 2025). The trustworthiness of the qualitative instruments was ensured through member checking and communicative validation. The reliability of the questionnaire was established through Cronbach's Alpha. For quantitative data, reliability was tested using Statistical Package for Social Sciences version 25, where Cronbach's alpha coefficient was calculated to measure internal consistency of questionnaire items and the reliability values are presented in table 1.

Table 1: Reliability statistics

Questionnaire Section	Number of Items	Cronbach's Alpha
Digital competence in instructional planning	10	0.842
Application of digital technologies during classroom teaching	10	0.873
Digital technologies in learner assessment	10	0.861
Factors limiting advanced use of digital tools	10	0.886
Strategic measures for addressing digital technology limitations	10	0.894

Source: Field data (2026)

Table 1 shows that the Cronbach's alpha coefficients ranged from 0.842 to 0.894. All coefficients exceeded the acceptable threshold of 0.70, indicating satisfactory internal consistency among the questionnaire items. The instrument was therefore considered reliable for collecting quantitative data. A coefficient above 0.70 indicates sufficient homogeneity among questionnaire items measuring the same construct (Willems et al., 2023). Therefore, all questionnaire sections were considered reliable and retained for the main study. Once research permit was granted, the researcher visited the sampled schools for introduction and schedule data collection dates.

Questionnaires were administered to selected teachers by the researcher to enhance response rates and provide clarification where needed (Fink, 2023). Interviews were conducted within the school premises, each lasting about 30 minutes to ensure privacy and concentration (Qu et al., 2022). Focus group discussions were held with Standard Six pupils ranges 6 to 8 pupils per group to encourage active participation. Descriptive statistics such as frequencies, means, and percentages were used to present the data (Field, 2024). Qualitative data from interviews were transcribed and analysed using thematic analysis, a method that involves identifying, analysing and reporting patterns or themes within the data (Braun and Clarke, 2022). During data collection, anonymity, confidentiality, privacy, dignity, and respect were maintained for all participants. Confidentiality was also maintained by assigning codes instead of using names (Wiles, 2022). After data collection, information was securely stored, used only for academic purposes, and reported without revealing participants' identities. To avoid plagiarism, all the cited authors were listed in the reference list following the recommended APA style 7th edition.

4. Results and Discussion

This section presents the findings according to the major themes derived from the study objectives.

4.1 Teachers' Digital Competence in Using Digital Technologies for Learner Assessment

The first theme examined teachers' skill in using digital technologies for learner assessment in public primary

schools. The questionnaire items covered preparation of assessment tasks, administration of assessments, recording of marks, performance analysis, digital feedback, progress tracking, learning-gap identification, continuous assessment, report generation, and updating of records. Interview and focus group data then clarify how digital assessment practices were experienced by school leaders and pupils. Teachers indicated their views on ten statements that measured different aspects of digital assessment practice. The responses were then summarized into frequencies, percentages and mean scores as presented in Table 2**.**

Table 2: Responses from Teachers on Digital Technologies in Learner Assessment (n=60)

Statement	SA		A		N		D		SD		Mean
	f	%	f	%	f	%	f	%	f	%	
I use digital tools to prepare assessment tasks.	5	8.3	24	40.0	19	31.7	12	20.0	0	0.0	3.37
I administer assessments using digital technologies.	6	10.0	20	33.3	15	25.0	13	21.7	6	10.0	3.12
I record learners' marks using digital systems.	6	10.0	19	31.7	15	25.0	16	26.7	4	6.7	3.12
I analyze learners' performance using digital tools.	7	11.7	27	45.0	10	16.7	13	21.7	3	5.0	3.37
I normally provide feedback to learners using digital platforms.	2	3.3	14	23.3	28	46.7	13	21.7	3	5.0	2.98
I track learners' progress using digital technologies.	3	5.0	17	28.3	26	43.3	8	13.3	6	10.0	3.05
I can use digital tools to identify learning gaps.	6	10.0	19	31.7	15	25.0	12	20.0	8	13.3	3.05
I can use digital tools to support continuous assessment.	2	3.3	22	36.7	16	26.7	14	23.3	6	10.0	3.00
I can use digital tools to generate assessment reports.	6	10.0	16	26.7	16	26.7	16	26.7	6	10.0	3.00
I can update digital assessment records regularly.	5	8.3	11	18.3	25	41.7	13	21.7	6	10.0	2.93

Source: Field Data (2026)

Regarding using digital tools to prepare assessment tasks, 8.3% strongly agreed, 40.0% agreed, 31.7% were neutral and 20.0% disagreed. The mean score of 3.37 indicated neutrality and showed that task preparation was a moderate assessment practice. Teachers appeared more confident in typing, printing, or arranging assessment items than administering fully digital assessments. This finding suggests that digital assessment was mainly used at the preparation stage. This finding is supported by Viberg et al. (2024) who emphasized that effective digital assessment requires strong pedagogical knowledge and assessment competence. Assessment preparation provides an entry point for broader digital assessment development.

Teachers explained how assessment tasks were prepared through computers and related devices. One head teacher said:

> Many teachers prepare examinations and tests using computer instead of hand writing. This helps them keep records and make corrections more easily. Some also use online sources to obtain questions and then revise them according to the needs and level of their pupils (personal interview on 16th, April 2026).

This was further supported by one academic teacher:

> For assessment, most teachers use computers to prepare tests and exercises. They also use Excel to enter pupils' marks and organize results. This has made result processing easier and has helped teachers rank learners and review academic performance more quickly than before (personal interview on 9th, April 2026).

The interviews showed that digital assessment administration is used by some teachers in the sampled schools. Teachers prepare or print materials using computers but still administered most assessments on paper. This explained the neutral quantitative rating and the continued dominance of traditional assessment procedures. The evidence also revealed that full digital administration required more devices compared to what most schools currently have. This interpretation is consistent with Bez et al. (2025) who show that digital assessment systems require teachers to process results meaningfully. Schools should improve preparation, recording, analysis and feedback while gradually expanding digital assessment.

During focus group discussion, pupils described their experiences with digital technologies in assessment activities. One pupil said that:

The computer is used to print examinations and enter our marks. The teacher also uses a tablet or phone to display pictures of past national examinations, so that we practice and prepare ourselves before sitting for tests or even examinations (Focus group discussion on 21st, April 2026).

Another pupil explained the same practice by saying:
Teachers use a printer to produce copies of examinations and tests. They also use computers, both laptops and desktops, to keep our information and prepare reports that show our academic progress in school. This has made it easy to timely receive our assessment outcomes as we always go home with our progress reports (Focus group discussion on 21st April 2026).

The pupils' statements located digital assessment mainly in preparation, printing and record keeping. They reported that computers, printers, phones and tablets are being used for tests and academic/progress records. This supported teachers' responses that digital tools were useful for preparing assessment tasks. However, pupils did not describe frequent direct completion of assessments through digital devices. The same position is reflected in Banitalebi et al. (2025), who show that positive attitudes may not translate into actual digital assessment practice. Digital assessment remained behind-the-scenes rather than learner-centered. Teachers should gradually introduce pupils to digital quizzes or feedback activities where devices support learning.

Concerning administering assessments through digital technologies, 10.0% strongly agreed, 33.3% agreed, 25.0% were neutral, 21.7% disagreed, and 10.0% strongly disagreed. The mean score of 3.12 indicated neutrality and suggested modest use of digital platforms during assessment administration. This shows that teachers were less likely to administer assessments digitally than to prepare them digitally. The responses reflect the continued use of paper-based assessment in the sampled public primary schools. The pattern agrees with Bez et al. (2025) who argued that digital assessment requires teachers to interpret and act on technology-based results. Digital assessment administration needs infrastructure, assessment literacy and learner access to devices.

Teachers explained why digital assessment administration remained less common even after preparation. One academic teacher said:

We use digital devices when handling assessment. Tablets are used to set examinations, produce results and upload results after marking. In upper classes, results can even be send directly. This reduces dependence on outside typing services and makes the teacher's work easier (personal interview on 10th, April 2026).

Another head teacher verified this by saying:
Teachers keep examination results in registers, but they also store them on tablets so that information can be accessed at any time. Although the main record is still kept in notebooks, tablets have helped greatly by making educational data easier to retrieve (Personal interview on 9th, April 2026).

The responses clarified that recording marks digitally depended on teachers' spreadsheet competence. Computers made recording faster and easier where teachers could enter, store and retrieve scores properly. This explained the moderate survey finding and the mixed responses across teachers. The evidence also suggested that some teachers still needed support in Excel and related applications. The evidence relates to Estaji et al. (2024) who identifies knowledge and contextual factors as part of digital assessment competence. Marks recording should be standardized through simple school templates. Teachers therefore need practical support in entering marks, checking accuracy and protecting assessment records.

4.2 Factors Limiting Teachers' Integration of Digital Tools in Instructional Planning, Classroom Teaching, and Assessment & Evaluation

The second theme identified factors that limited teachers' integration of digital tools in instructional planning, classroom teaching, and assessment & evaluation in public primary schools. The analysis mainly considered whether teachers were well trained on how to use digital devices in teaching. The analysis concentrated on accessibility of internet, devices availability, large classes, planning time, technical support, school leadership, teacher confidence, curriculum demands and power-related challenges. The interpretation combines questionnaire results with interview and focus group evidence to explain why advanced digital pedagogy remained difficult. Teachers rated ten statements that represented training, internet, infrastructure, leadership, confidence, curriculum and technical constraints. Their responses were quantified to generate frequencies, percentages and mean scores as presented in Table 3.

Table 3: Responses from Teachers on Factors Limiting Teachers' Integration of Digital Tools in Instructional Planning, Classroom Teaching, and Assessment & Evaluation (n=60)

Statement	SA		A		N		D		SD		Mean
	f	%	f	%	f	%	f	%	f	%	
1. I lack adequate training to use digital tools for advanced instructional strategies	12	20.0	6	10.0	22	36.7	13	21.7	7	11.7	3.05
2. Limited access to reliable internet prevents me from integrating digital tools beyond basic substitution.	14	23.3	8	13.3	20	33.3	15	25.0	3	5.0	3.25
3. Insufficient availability of digital devices in my school limits innovative technology use.	6	10.0	14	23.3	22	36.7	17	28.3	1	1.7	3.12
4. Large class sizes make it difficult to use digital tools for interactive or student-centered activities.	17	28.3	5	8.3	18	30.0	15	25.0	5	8.3	3.23
5. I do not have enough time to plan lessons that integrate digital tools at higher levels.	2	3.3	17	28.3	19	31.7	15	25.0	7	11.7	2.87
6. Lack of technical support discourages me from using digital tools in more transformative ways.	3	5.0	16	26.7	25	41.7	7	11.7	9	15.0	2.95
7. School leadership does not actively support innovative use of digital technology.	2	3.3	16	26.7	20	33.3	15	25.0	7	11.7	2.85
8. I feel less confident using digital tools for collaborative or creative learning activities.	0	0.0	12	20.0	12	20.0	31	51.7	5	8.3	2.52
9. The school curriculum and assessment system do not encourage advanced integration of digital tools.	3	5.0	12	20.0	25	41.7	11	18.3	9	15.0	2.82
10. Power outages and technical problems limit my ability to use digital tools effectively.	5	8.3	18	30.0	13	21.7	17	28.3	7	11.7	2.95

Source: Field Data (2026)

Regarding inadequate training for advanced instructional strategies, 20.0% strongly agreed, 10.0% agreed, 36.7% were neutral, 21.7% disagreed and 11.7% strongly disagreed. The mean score of 3.05 indicated neutrality and suggested that training was a concern for some but not all teachers. The large neutral group may mean that teachers had received basic exposure but not advanced pedagogical training. Advanced use requires teachers to design collaborative, interactive and creative learning activities with technology. The same position is reflected in Trust et al. (2023), who identified insufficient pedagogical training as a barrier to higher levels of digital integration. Training should move beyond basic operation towards lesson design.

This was pointed out by one head teacher who stated:

The major challenge is limited devices. The equipment that exists is not enough for all teachers and some tablets have already been damaged. Because of that shortage, many teachers cannot use digital tools consistently for planning, teaching and assessment as they wish (personal interview on 8th, April 2026).

One academic teacher confirmed the situation by saying:
Teachers are facing two main challenges: that is shortage of digital devices and limited skills in integrating digital technology in teaching. Inadequate number of digital devices discourage teachers in technology adoption (personal interview on 9th, April 2026).

Teachers also described infrastructure barriers that limited integration of digital tools in instructional planning, classroom teaching, and assessment & evaluation digital substitution. One head teacher said:

There is no electric power for supporting the use of digital tools in my school, this limits the use of available digital devices like tablets and smartphones (personal interview on 9th,, April 2026).

The interview narratives showed that internet access shaped the depth of digital use. Teachers used internet connections for searching, downloading, communication and sharing learning materials with colleagues. However, unreliable connectivity and data costs reduced the frequency of such practices. This is evidenced in the neutral responses alongside those who agreed about limited internet. The pattern agrees with Makula et al. (2025), who identified restricted internet access and high data costs as constraints in Monduli district. Advanced pedagogy cannot depend

only on teachers' personal data bundles. Schools need affordable connectivity and offline resource banks to support regular digital teaching.

Concerning limited reliable internet, 23.3% strongly agreed, 13.3% agreed, 33.3% were neutral, 25.0% disagreed and 5.0% strongly disagreed. The mean score of 3.25 showed neutrality while still revealing internet access as an important constraint. Teachers who agreed indicated that connectivity affected movement beyond downloading and simple reference use. The neutral responses suggest that internet problems varied across schools, teachers, or learning activities.

This was also expressed by one academic teacher who said:
The serious problem which teachers faces is limited skills in using digital devices, since some teachers have not acquired enough training to use digital devices in teaching, instead they continue using traditional methods of teaching without the support of digital devices as a result they find it difficult to adopt modern teaching (personal interview on 9th, April 2026).

The point was further explained by one head teacher who stated:
The school is facing shortage of digital tools, internet accessibility and lack of teachers' professional development due to cost of data bundles, moreover, internet signal is weak due to the fact that school is located in an area which does not receive strong mobile network signals (Personal interview on 10th, April, 2026).

Teachers described internet cost and connectivity as barriers to advanced digital practice the interviews showed that insufficient devices kept technology close to teacher preparation rather than pupil interaction. Teachers might own phones or tablets, yet classes required larger displays and enough devices for learners. This clarified why device availability appeared as a barrier despite some positive responses. The evidence also showed that limited projectors reduced the visibility of digital content during lessons. This finding is supported by Mtebe et al. (2022) who identified device shortages as a major barrier to meaningful ICT use. Schools need classroom-ready devices, not only personal teacher devices. Resource planning should prioritize projectors, computers, secure storage and maintenance systems.

With respect to insufficient digital devices, 10.0% strongly agreed, 23.3% agreed, 36.7% were neutral, 28.3% disagreed, and 1.7% strongly disagreed. The mean score of 3.12 indicated neutrality and showed that device scarcity affected several schools. The results suggest that access to computers, tablets, projectors, or displays was uneven across the study sites. Without enough devices, teachers may use technology for personal preparation rather than direct pupil engagement. This interpretation is consistent with Mtebe et al. (2022) who mentioned that device shortages is among barriers limiting meaningful technology use in Tanzanian. Advanced integration requires enough equipment for classroom visibility and pupil participation. Qualitative responses were therefore reviewed to explain how device shortages shaped classroom practice.

This was clarified by one head teacher who explained:
Internet access is also a challenge. Schools often do not have a reliable connection or router, so teachers buy data bundles using their own money. Many feel that this is expensive and the cost negatively affected how often digital resources are used (Personal interview on 14th, April 2026).

This was further supported by one academic teacher who added:
The absence of internet accessibility de-motivates teachers from integrating technology into teaching. Teachers who are interested in technology buy internet bundles but cannot afford to do so regularly, as a result, technology use becomes an optional rather than necessity (personal interview on 9th, April 2026).
The respondents explained that large classes weakened collaborative digital learning. Many pupils needed to see the same screen, share few devices and receive teacher guidance simultaneously. This made supervision difficult and reduced opportunities for each learner to manipulate digital tools. The narrative therefore supported the neutral but meaningful questionnaire result on class-size limitations. The same position is reflected in Trust et al. (2023) links advanced integration with time, redesign and classroom pressures. Digital lesson planning should consider grouping and class management realities. Teachers need strategies for rotating learners, assigning roles and maintaining attention in large classes.

Furthermore, during the interviews, teachers explained how access to devices affected learner participation in digital activities. One head teacher pointed out that:

Internet problems affect both teachers and pupils. Even if a teacher wants to assign work that depends on online search, many pupils do not have home access. This forces teachers to download everything themselves and reduces chances for broader digital learning (personal interview on 9^{14h,} April 2026).

One academic teacher strengthened this view by explaining:
Teachers generally want to use technology because it makes work easier, but willingness alone is not enough. When resources are few, internet is costly and practical support is weak, the use of digital tools often stops at typing notes or storing files (personal interview on 9th, April 2026).

The interviews showed that teacher confidence differed by age, experience, and exposure to digital tools. Younger teachers were often described as more willing to experiment, while some senior teachers preferred assistance. This clarified why the respondents disagreed with confidence as a general barrier but still revealed some concern. Confidence therefore appeared uneven rather than absent among the teaching staff. This interpretation is consistent with Huong et al. (2025), who found that confidence can be lower in technical problem solving and advanced tools. Confidence building should be differentiated according to teacher readiness. Peer

mentoring can help hesitant teachers learn from colleagues who already use devices effectively.

On power outages and technical problems, 8.3% strongly agreed, 30.0% agreed, 21.7% were neutral, 28.3% disagreed, and 11.7% strongly disagreed. The mean score of 2.95 indicated disagreement but still showed a notable group affected by infrastructure challenges. This mixed response suggests that electricity and technical reliability differed across schools and teaching situations. Where power supply was unstable, teachers could not depend on projectors, computers, or other classroom devices. The same position is reflected in Mtebe et al. (2022), who identified weak technical support and limited infrastructure as barriers to ICT preparedness. Reliable power and equipment maintenance remain necessary for consistent technology-enhanced pedagogy. Teachers described how power and technical problems affected technology use. One academic teacher said:

Large classes make digital teaching difficult because interactive use requires visibility, movement and close supervision. When one teacher handles many pupils with very few devices, technology is more likely to support basic presentation than collaborative or creative learning activities (personal interview on 9th, April 2026).

One head teacher reinforced the point by explaining:
Teachers have embraced technology with interest, yet the school environment has not fully matched that enthusiasm. Stronger infrastructure, reliable power, affordable internet, more devices and continued technical support are still required if digital pedagogy is to move beyond substitution (personal interview on 9th, April 2026).

The responses showed that digital limitations required coordinated action rather than isolated teacher effort. Teachers expressed interest in technology, but infrastructure, internet, devices and technical support limited continuity. This explained why the questionnaire showed mixed responses across different barrier items. The evidence also revealed that personal commitment could not replace institutional investment and system-level support. The pattern agrees with Mhlanga and Moloi (2024), who connect rural digital integration challenges with availability of electricity, training and leadership support. Advanced digital pedagogy requires planning across school and district levels. Support should combine infrastructure, professional development, technical maintenance, and monitoring of classroom implementation.

Focus group discussion showed how electricity and school infrastructure affected digital technologies. The pupils' responses connected technology use with electricity, safe classrooms, and the physical condition of school buildings. Their evidence showed that digital teaching depended on infrastructure that learners could directly observe during lessons. This supported teachers' responses on power outages and technical problems as barriers to effective digital use. It also confirmed head teachers' concerns about maintenance, storage, and reliable access to devices.

5. Conclusion and Recommendations

5.1 Conclusion

Based on the study findings, the following conclusions were made.

Teachers' skill in using digital technologies for learner assessment was found to be moderate. This leads to the conclusion that digital assessment has started to take root in the schools through test preparation, mark recording and some performance analysis, but it has not yet developed into a strong and comprehensive digital assessment system.

In addition, it is concluded that the use of digital tools beyond basic substitution is constrained by a combination of infrastructural, technical, training and pedagogical factors. The study therefore concludes that the main challenge is not merely teachers' willingness to use technology, but the wider conditions that limited progression from basic digital use to more advanced and transformative forms of pedagogy.

Finally, this study concludes that effective integration of digital technologies in instructional planning, classroom teaching, assessment and evaluation in public primary schools requires a combination of teacher competence, institutional support, adequate infrastructure, and conducive policy environments. Also, successful technology adoption depends not only on positive attitudes and perceptions but also on the availability of facilitating conditions and supportive institutional structures.

5.2 Recommendations

Based on the conclusion, the study recommended the following:

1. School leaders and education officers need to improve access to classroom digital devices such as projectors, laptops, and related teaching equipment so that teachers can apply digital technologies more effectively during lesson delivery and involve learners more actively in classroom processes.
2. Training programs need to put emphasis on digital learner assessment so that teachers can improve their ability to provide digital feedback, generate reports, update records regularly, and use assessment information more effectively in monitoring learner progress.
3. The government and other education stakeholders need to address internet access, electricity, technical support and maintenance services in public primary schools so that teachers can progress from basic integration toward more innovative and learner-centred technology use.
4. School management need to strengthen internal

support systems by creating school-based mentoring and peer learning arrangements through which teachers with stronger digital competence can support colleagues who still experience difficulty in advanced use of digital tools.

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